Remarks

Claims 1 and 2 were rejected as anticipated by Ho. Claims 3 and 4 were objected to as depending on rejected based claims. Claims 5-20 were found allowable. Applicant requests reconsideration.

Applicant appreciates the examiner's thorough consideration of applicants' prior arguments. Claim 1 was rejected as anticipated by Ho, and as such Ho must contain everyone of the claimed elements. Both Ho and claimed invention use transmitter precoding and receiver filtering. However, these precoders and filters are completely different for serving different purposes. As such, the anticipation rejection is unsupported. Particularly, Ho uses precoding in combination with anti-aliasing filtering for communicating a pilot tone, whereas the claimed invention uses precoding in combination with absolute phase filtering for removing the need for differential decoding. Curiously, allowed claims 3, 5, 10, 11 and 18 all expand upon the claimed absolute phase filter, and it is not understood why all of these claims would be allowed, and claim 1 rejected, when they also recite an absolute phase filter. An explanation as to this apparent inconsistency is kindly requested.

The examination "disagrees with applicant's assertion that the filtered output from the filtering step in claim 1 is the estimate of the data stream, rather it is an indication of the sequences of data symbols. Even for argument sake, the limitation of the filtering step is interpreted in light of the specification, Applicant should refer to the filter disclosed in page 10 of the specification. The filter 28 as disclosed is NOTHING BUT to generate a filtered signal to be sample by the sampler 30. Therefore, the filter 14 in the system of Ho does the SAME function as that of the filtering step of claim 1."

Therein lies the examination's miscomprehension of the claimed invention, and its relationship to Ho. There are two fundamental flaws in the examination's reasoning. The examination's statement that "The filter 28 as disclosed is nothing but to generate a filtered signal to be sample by the sampler 30.", is an unfortunate gross undercharacterization. The examination's statement that the examiner disagrees that the output of the claimed filter is an estimate of the bit stream, is an unfortunate erroneous conclusion.

The specification teaches: "The received baseband signal $Z_r(t)$ is first filtered by the filter bank 28 that consists of F matched filters, where F is at most $Q=2^{L-1}$ for 2-ary GMSK signaling, and at most $P=3\cdot[2^{L-1}]^2$ for 4-ary GMSK signaling. The filters in the

filter bank 28 are matched to the Laurent amplitude-modulated pulses (PAM) of the transmitted baseband GMSK signal $Z_b(t)$, and may be implemented as a matched filter bank or an integrate-and-dump type filter bank. The filter bank 28 provides filtered signals $r_k(t)$ for $0 \leq k \leq F-1$, which are sampled by the sampler 30 at every symbol time instants $t_n=nT$ to produce discrete sample values $r_{k,n}$.", and, "With the decoding states still defined as $S_n=(d_n,d_{n-1})$, a 2^2-state 2^3-branch Viterbi algorithm is again sufficient for demodulating source symbols $\{d_n\}$ when two 2-ary matched filters are used in the filter bank 28.", and "The duration of the 4-ary amplitude modulated pulses $\{f_k(t)\}$ is also presented in batches, that is, $D_0=L+1$, $D_1=D_2=L$, $D_3=...=D_{11}=L-1$. The 4-ary trellis demodulator is simplified by retaining the first F=1, F=3 or F=12 matched filters in the filter bank 28.", and "In both cases, with the decoding state defined as $S_n=(d_n)$, a 4^1-state 4^2-branch Viterbi algorithm is sufficient for demodulating the source symbols $\{d_n\}$ when three 4-ary matched-filters are used in the filter bank 28.", and "The function of the precoder 12 in the GMSK transmitter 10 is to precondition the symbol sequence α_k as an effective reverse function of differential encoding that intrinsically results from the GMSK modulation process. The precoding produces absolute phase

demodulation achieved within the GMSK receiver 20. This absolute phase demodulation eliminates the need for differential decoding of matched filters 28 while providing an improvement in signal detection performance. The preferred precoding algorithms are specific to M-ary CPM signals.", and " The present invention is directed to the precoding of a data sequence into an encoded sequence of transmitted symbols, to avoid differential decoding and for improving the BER using Laurent filtering. In the preferred form, a precoder is applied to 2-ary and 4-ary symbol sets used in a GMSK transmitter having a Gaussian filter defined by respective BT products and frequency modulator modulation indices. The preferred GMSK receivers included matched filters 28, sampling 30, and Viterbi decoding 32."

One of modest skills in the art of GMSK communications would agree that the specification teaches a little more about the claimed absolute phase filter than simply being used to provide a filtered output for sampling, as the examination incorrectly asserts. As more particularly taught in the specification, the preferred absolute phase filter is a PAM Laurent filter, that is not only matched to the transmitter Gaussian modulation, but also can be implemented as a bank of PAM filters, so at to provide an absolute phase indicating the bit/symbol stream. In so doing, the filter output has an absolute phase that directly indicates the bit/symbol stream, though further decoding would tend to decrease

error rates in noisy channel environments. For example, in the binary case of M=1, using the principal component Laurent filter, the sampling of only the sign of the filter output provides <u>EXACTLY</u> the original bit stream, in the absence of noise. <u>Surely, an exact reproduction</u> of the original bit stream at the output of the filter <u>is an indication</u> of the original bit stream. In the presence of noise, system performance would suffer, and hence, as then found in claim 2, additional decoding is used to improve the bit error rate. Perhaps a realization that the sign, that is, the sign of the absolute phase of the filter output can be directly decoded by a simple hard-limited, into the bit/symbol stream, without the use of any decoding, the examiner may now fully realize how different are the two filtering processes. The claimed invention uses transmitter precoding in combination with receiver absolute phase filtering for providing a filter output having an absolute phase that indicates the original bit stream. Ho also teaches transmitter precoding and receiver filtering, but both are different vis-à-vis the claimed invention, for solving different problems. The two functions are completely different for different purposes. The purpose of precoding and PAM filtering in the present invention removes the need for differential decoding. Ho does not teach this problem nor the claimed solution.

More specifically, claim 1 includes the limitation of filtering the continuous phase modulated (CPM) signal into a

sequence of filtered signals having an absolute phase for indicating the sequence of data symbols. It is the phase of the filter output signal that is sampled, and this sampled output indicates the original bit stream. While the output of filter of Ho must contain superimposed signal components that can be eventually decoded into the original bit stream by translating signal component information into a bit stream, none of those components as taught has absolute phase components indicating the bit stream, a characteristic of PAM filtering in combination with particular precoding. Rather, Ho uses a decoding process that is required to differentially translate the filtered components of the filter output into an estimate of the original bit stream, and hence Ho requires decoding, whereas the present invention of claim 1 does not. There is no decoding step in claim 1, as the sampled filter output already directly provides an indication of the bit stream. This should underscore the importance of the claimed filter providing absolute phase information for sampling. Dependent claim 2, then adds in a decoding step, but this decoding step serves to improve the bit error rates in the presence of noise, and not for differential transnational decoding the filter output into an estimate of the bit stream. That is, the decoding step in claim 2 is primarily used for noise reduction, not for differential translating the sampled filter outputs. The decoding process in claim 2 is not a differential decoding process. This is the primary benefit of the claimed invention.

No where in Ho is it disclosed that the anti-aliasing filter output has an absolute phase that indicates the bit/symbol stream. Claim 1 was rejected for anticipation by Ho, yet Ho does not have an anticipatory teaching of transmitter precoding in combination with receiver absolute phase filtering used for providing a sampled filtered output having an absolute phase indicating the bit/symbol stream. At this very point of novelty, that is, the use of transmitter precoding and receiver absolute phase filtering to provide an absolute phase indicating the bit/symbol stream, Ho does not teach nor suggest this combination. Applicant respectfully requests allowance of all of the claims.

Respectfully Submitted

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